[NAME OF DOCUMENT] CLAIMS

[CLAIM 1]

An electric power supply apparatus for supplying electric power with different frequencies to an induction load to make the induction load work, comprising:

a generator that outputs AC electric power with different frequencies;

a matching circuit that constitutes, together with the induction load, a plurality of resonance circuits corresponding to the different frequencies; and

a control circuit that controls the supply of the AC electric power output from the generator to one of the resonance circuits of the matching circuit so that the frequency of the AC electric power matches a predetermined resonance frequency.

[CLAIM 2]

The electric power supply apparatus according to claim 1,

wherein the matching circuit includes a transformer which converts a plurality of load resonance impedances to substantially equal oscillator output impedance.

[CLAIM 3]

The electric power supply apparatus according to claim 2,

wherein the transformer includes a primary winding connected to the generator so as to be supplied with the AC electric power, and a secondary winding having a tap which converts a plurality of different load resonance impedances to substantially equal oscillator output impedance.

[CLAIM 4]

The electric power supply apparatus according to claim 2,

wherein the transformer includes a plurality of the transformers, the plurality of the transformers being provided for each of the resonance circuits which convert the load resonance impedance to the oscillator output impedance.

[CLAIM 5]

The electric power supply apparatus according to any one of claims 1 to 4,

wherein the control circuit is provided with a frequency electric power ratio controller which switches the frequency of the AC electric power output from the

generator according to a condition in which the induction load works.

[CLAIM 6]

The electric power supply apparatus according to claim 5,

wherein the frequency electric power ratio controller sets the frequency of the AC electric power output from the generator based on a set input signal concerning the condition in which the induction load works, the condition being set by an input operation from an input section.

[CLAIM 7]

The electric power supply apparatus according to claim 5 or 6,

wherein the frequency electric power control circuit includes a low-frequency synchronizing circuit which controls the oscillation frequency of the generator so that an output frequency of the low-frequency electric power output from the generator becomes a predetermined series resonance frequency which is characteristic of impedance, a high-frequency synchronizing circuit which controls the oscillation frequency of the generator so that an output frequency of the high-frequency electric power output from the generator becomes a predetermined series resonance frequency which is characteristic of impedance, and a frequency electric power control circuit which switches between the low-frequency and the high-frequency.

[CLAIM 8]

The electric power supply apparatus according to any one of claims 1 to 4,

wherein the control circuit is provided with a frequency electric power ratio controller which controls to switch the frequency of the AC electric power output from the generator in unit of cycle.

[CLAIM 9]

The electric power supply apparatus according to claim 8,

wherein the frequency electric power ratio controller is capable of changing a time ratio at which the respective frequencies are alternately output, based on the set input signal concerning the condition in which the induction load works, the condition being set by an input operation from a input section.

[CLAIM 10]

The electric power supply apparatus according to any one of claims 1 to 9,

wherein the control circuit controls the frequency of the AC electric power output from the generator based on a frequency current flowing in the resonance circuit.

[CLAIM 11]

The electric power supply apparatus according to claim 10,

wherein the control circuit includes synchronous control circuits corresponding to each of the frequencies of the AC electric power supplied from the generator, and a storage for, when transiting to a quiescent period during which the AC electric power is not supplied from the generator with respect to a predetermined frequency, storing frequency information concerning the predetermined frequency,

wherein when transiting to an operation period during which the AC electric power is supplied from the generator with respect to the predetermined frequency, the respective synchronous control circuit performs the synchronous control based on a synchronizing information stored in the storage.

[CLAIM 12]

The electric power supply apparatus according to any one of claims 1 to 11,

wherein the control circuit is provided with an output control circuit which changes the output of the AC electric power output from the generator.

[CLAIM 13]

The electric power supply apparatus according to claim 12,

wherein the generator includes a converter circuit which converts the AC electric power to a predetermined DC electric power, and an inverse conversion circuit which converts the DC electric power converted by the converter circuit to a predetermined AC electric power, and

wherein the output control circuit feedback-controls an output value of the DC current output from the converter circuit.

[CLAIM 14]

The electric power supply apparatus according to any one of claims 1 to 13,

wherein the generator is provided with an inverse conversion circuit which converts the DC electric power to a voltage square wave AC electric power.

[CLAIM 15]

An induction heating apparatus comprising:

an electric power supply apparatus according to any one of claims 1 to 14, and

an induction heating coil which induction-heats a workpiece-to-be-heated with the electric power having different frequencies supplied from the electric power supply apparatus.